hp StorageWorks SDLT tape drive

getting started guide

internal model

DLT TAPE

SDLT 600i

hp invent

open this flap for quick start installation poster

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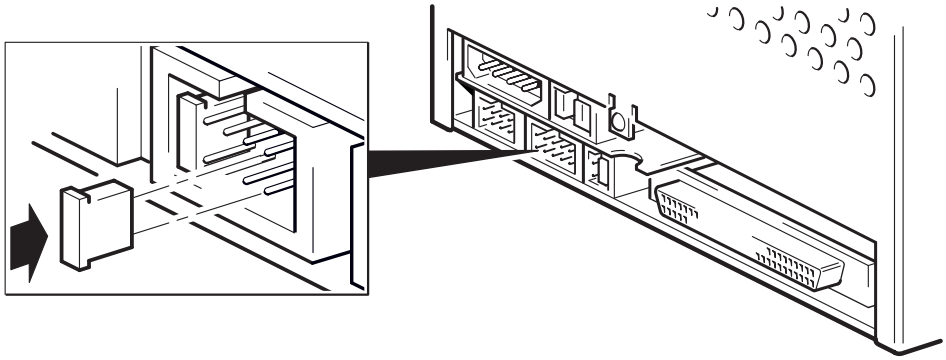

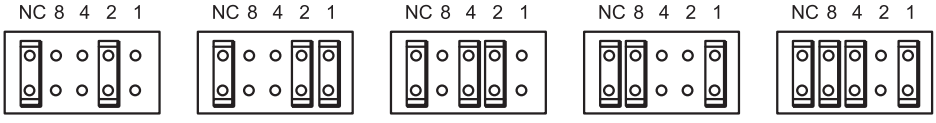

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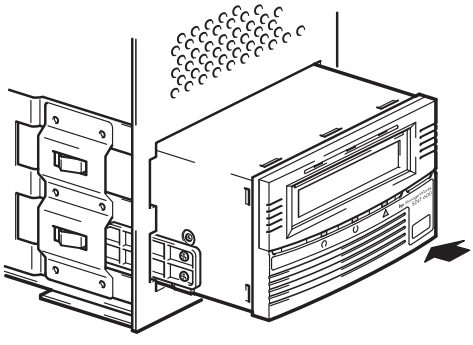

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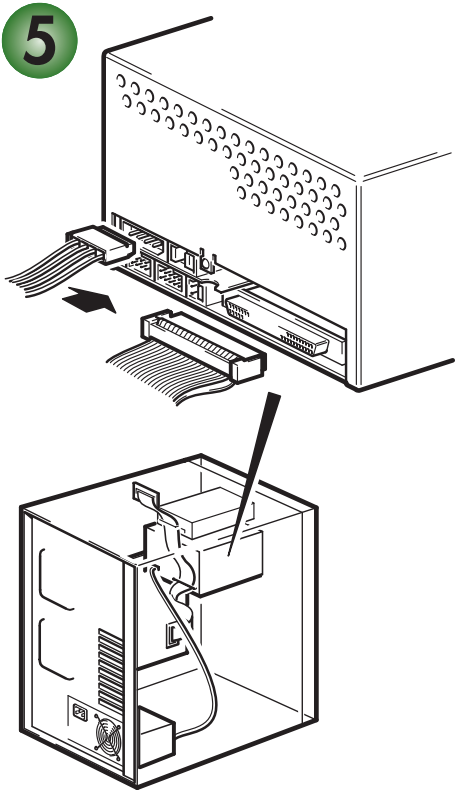

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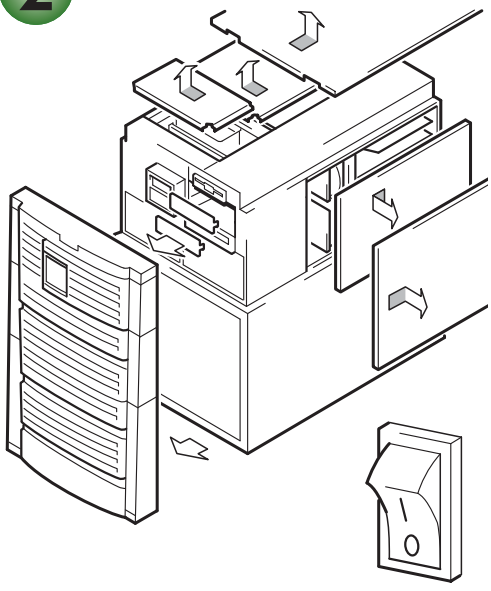

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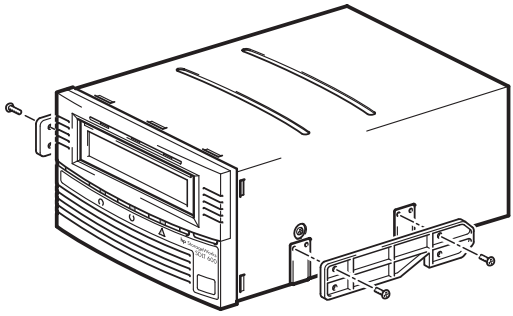

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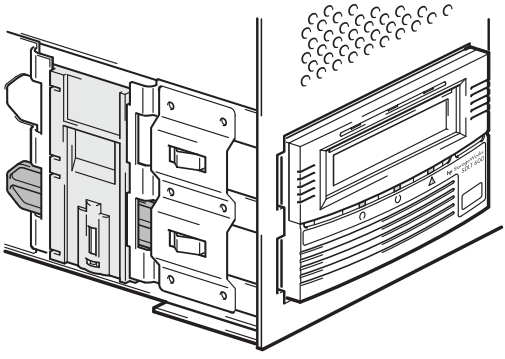


Internal drives - contents

January 2004

Part Number: AA984-90902

Printed in the U.K.

Product Details

Write your tape drive details here so you can find them easily if you need them. The model name is on the front of the drive and the product and serial numbers are on a label on the bottom of the drive.

Model (type of drive):	
Model (number):	
Serial (number):	
Date purchased/installed:	
SCSI ID:	

Before you start

The HP StorageWorks SDLT 600 tape drive is a high-capacity, high-performance streaming tape drive. It is installed into a spare drive bay in your server. Before starting to install your tape drive, you should consider the following.

Which operating systems are supported?

HP StorageWorks SDLT 600 drives can be connected to servers running under Windows®, NetWare, UNIX, Tru64, OpenVMS and Linux. Refer to the "HP StorageWorks Tape Software Compatibility" topic on our World Wide Web site (`www.hp.com/go/connect`) for more information about the operating system versions that are supported.

How do I the connect the tape drive to my server's SCSI bus?

Your tape drive is attached to the SCSI bus of the host server via a spare connection on the internal SCSI ribbon cable (supplied with the drive). The cable must be terminated, see page 19.

You will need a properly installed and configured SCSI host bus adapter (HBA) or a built-in SCSI controller on your server. For optimum performance your tape drive should be connected to an Ultra 3 (160) or Ultra 4 (320) host bus adapter or SCSI controller using a correctly terminated, LVDS-compatible ribbon cable with a spare 68-pin, high-density (HD), wide SCSI connector. We strongly recommend that you use the SCSI ribbon cable supplied with the drive, see page 19. We also recommend that the drive is the only device on the SCSI bus. Do **not** connect more than two tape drives per SCSI controller. Do **not** attach the drive to the same SCSI bus as your disk drive or to a RAID controller.

Why is the SCSI bus type important?

The SCSI bus type determines the speed at which data can be transferred between devices on the bus and the maximum length of cable that can be used. HP StorageWorks SDLT 600 tape drives are high performance Ultra 3 SCSI devices with a maximum burst transfer speed of 160 MB/second. To benefit from this level of performance, it is important to ensure that the drives are connected to a SCSI bus of a similar or higher specification. This means that you need:

- **An Ultra 3 (160) or Ultra 4 (320) SCSI bus.** Ultra 160 SCSI supports the maximum bus speed of 160 MB per second, Ultra 320 SCSI exceeds this.
- **LVD-rated SCSI cabling and terminators.** The LVD interface and cable supplied with the drive enable the data to be transferred at the drive's maximum rate and provide a maximum cable length of 12 meters.

If you attach the drive to a lower specification SCSI bus, it may still work, but data will not be transferred as quickly. For example, on a single-ended (SE) Ultra 160 SCSI bus the maximum burst transfer speed of the drive is 40 MB/second and the maximum cable length is restricted to 3 meters. See also Table 1, "supported SCSI bus types," on page 9.

Note The drives are not compatible with high voltage differential (HVD) SCSI devices.

How can I check the SCSI bus type?

For most operating systems you can install HP Library & Tape Tools, directly from the web site at `www.hp.com/support/tapetools` or from the link on the *HP StorageWorks Tape*

CD-ROM, and run the "Install Check" to check your server's current SCSI configuration (see page 33). This will provide information about the SCSI bus and the SCSI IDs in use.

What are the mounting requirements for the tape drive?

Mounting bay

You need one industry standard, 5¼-inch, full-height bay in which to install the HP StorageWorks SDLT 600 tape drive. Power requirements are:

Voltage	Typical Current	Maximum Current
5 V	3.1 A (standby) to 5.5 A (write-streaming)	5.6 A
12 V	0.1 A (standby) to 0.7 A (media loading/unloading)	0.7 A

Mounting hardware

For many servers, no mounting tray or rails are required. Devices simply slide into the server's chassis and are fixed with screws. Other servers have built-in trays or rails.

Rail kits for a number of industry-standard servers may be available. For more details refer to: `www.hp.com/go/connect`.

Some servers use non-standard mounting rails and do not include spares. If this is the case with your system, you will have to order these accessories from the server manufacturer before you can install the tape drive.

Air flow requirements

The internal tape drive requires adequate air flow to dissipate the heat resulting from continuous drive operation. Specifically, the air flow must be sufficient to keep the tape path temperature below 50° C ambient operation. Always operate the tape drive within an ambient air temperature of no more than 40° C.

It is important to keep the cooling holes in the rear and the grill in the front of the tape drive clear of any obstructions that may hinder the air flow and to ensure that all fans in your server are in place and operational. Make sure that empty bays have the appropriate blanking plates installed so that airflow is maintained.

Do I need additional items for installation?

- You may need mounting hardware. See "What are the mounting requirements for the tape drive?" above.
- If you do not have a spare, suitably rated SCSI connector on your server, a new HBA (also known as a SCSI card) will be required. We recommend that a 64-bit Ultra 3 (160) HBA is used. For specific details relevant to your server model please refer to `www.hp.com/go/connect`. You will need to purchase and install the new HBA into an unused, 64-bit PCI expansion slot within your server before installing your tape drive. (The kit can also be installed in a 32-bit PCI expansion slot, but performance may be degraded.)

Refer to our World Wide Web site for recommended products, configurations and ordering information: `www.hp.com/go/connect` or `www.hp.com/support`.

Backup software and drivers

Backup software

For optimum performance it is important to use a backup application that is appropriate for your system's configuration. In a direct attach environment, where the tape drive is attached to a standalone server, you can use backup software that is designed for a single server environment. In network configurations you will need backup software that supports enterprise environments. HP, Veritas, Legato, Yosemite and Computer Associates all provide suitable products. Further details about these and other products that may be appropriate can be found on our connectivity web site.

1. Go to our connectivity web site: `www.hp.com/go/connect` and select `tape backup`.
2. Select `software compatibility`.
3. Select your combination of operating system and tape drive model in the table. A list of supported backup applications is displayed. This will also tell you whether your configuration is compatible with HP One-Button Disaster Recovery, HP OBDR.
   (All HP StorageWorks SDLT 600 tape drives support HP OBDR. However, you can only use this feature. if your system configuration and backup application also support it. See "Using HP OBDR" on page 31.)
4. Make sure you have a backup application that supports HP StorageWorks SDLT 600 tape drives and download any upgrades or patches, if required.

Drivers

Windows users

After you install the tape drive, insert the *HP StorageWorks Tape* CD-ROM and follow the link to download the HP driver from our web site: `www.hp.com/support`. Refer to the accompanying README file for specific installation instructions for Windows NT, Windows 2000, Windows XP and Windows Server 2003 drivers.

Note: We recommend that you install drivers from the CD-ROM rather than the Windows Hardware Installation Wizard, as you can also use software on the CD-ROM to verify that your installation is correct (see "HP Library & Tape Tools" on page 33). If you do not have internet access, you can also download drivers directly from the *HP StorageWorks Tape* CD-ROM, but these may not be the latest versions available.

UNIX and OpenVMS users

The recommended backup applications use the operating system's standard, built-in device drivers. To upgrade drivers we recommend that you patch to the latest version of the operating system, following the instructions in the patch documentation.You will also find information about configuring device files in the *Configuration Guides* on the CD-ROM.

IA64 users

If you are installing on IA64 system, such as an HP Integrity server, check `www.hp.com/go/connect` for the latest information on the availability of backup application upgrades and drivers.

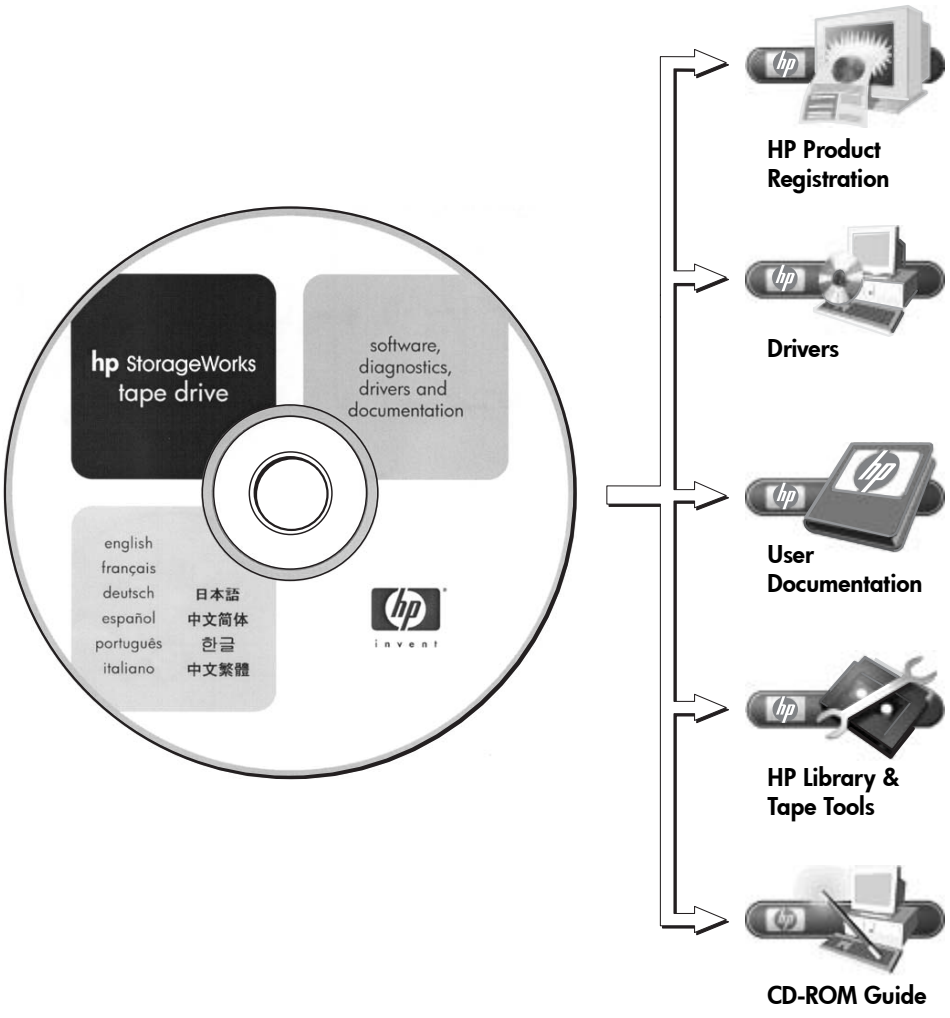


Figure 1: the *HP StorageWorks Tape* CD-ROM

Using the CD-ROM

The *HP StorageWorks Tape* CD-ROM contains drivers, useful utilities and information to help you install and use your tape drive. Before installation, users of most operating systems can use the link to HP Library & Tape Tools software to check SCSI ID information on the SCSI bus. UNIX users may like to print off the UNIX configuration guide.

Drivers

For detailed information about drivers, refer to the appropriate README file in the `DRIVERS` directories on the *HP StorageWorks Tape* CD-ROM. There is a separate sub-directory for each operating system.

HP Library & Tape Tools

HP Library & Tape Tools software provides diagnostic and troubleshooting utilities. It allows you to identify your product correctly, check SCSI ID information on the SCSI bus, run tests, carry out firmware upgrades and, if necessary, generate comprehensive troubleshooting information for support calls. For further details see page 33.

User documentation

Refer to the "User Documentation" topic on the *HP StorageWorks Tape* CD-ROM for a UNIX Configuration guide and an online User's Guide that provides more detailed information about using your HP StorageWorks SDLT 600 tape drive.

Refer to your backup application's documentation for instructions on how to back up and restore data.

CD-ROM guide

The CD-ROM guide provides an overview of the CD directory structure and information about the languages in which the contents of the CD-ROM are available. It also contains a set of URLs and links for further information.

HP product registration

To register your new tape drive electronically via the web, use the "Product Registration" link on the *HP StorageWorks Tape* CD-ROM.

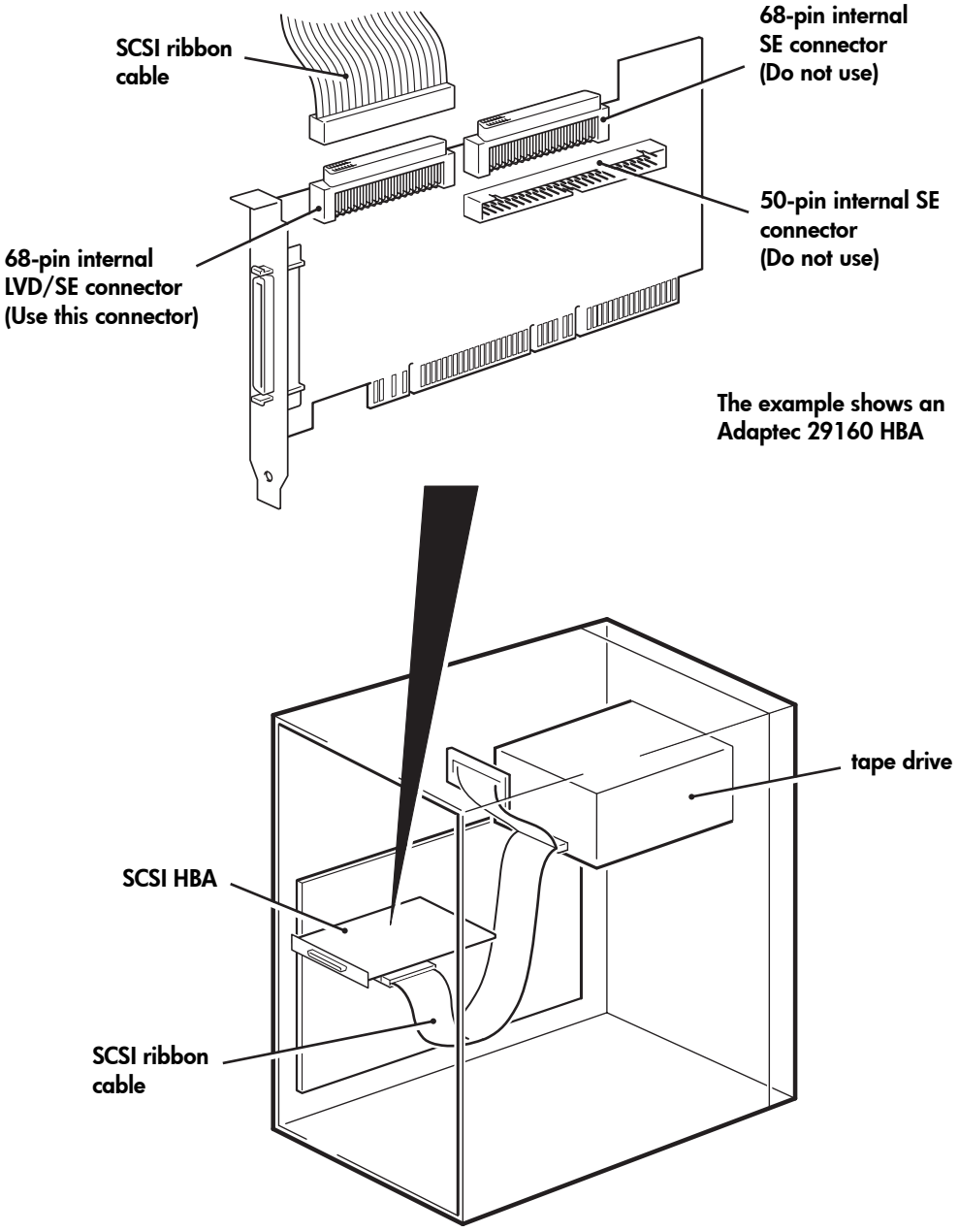
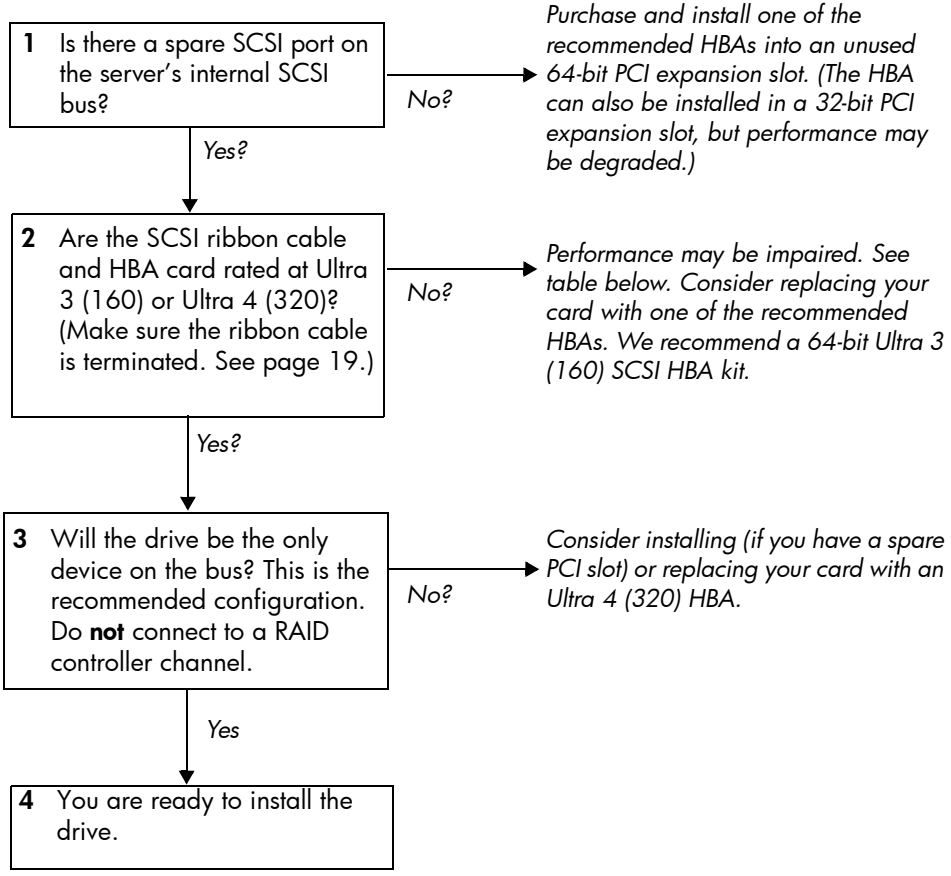


Figure 2: checking the SCSI connection

Step 1: Check the SCSI connection

Use the following questions to help you check your SCSI connection. As long as you have a spare drive bay in your server you should have a spare connection on the internal SCSI bus. You need to ensure it is the correct SCSI bus type. Most users can use HP Library & Tape Tools to check the SCSI bus type, see page 33. If you answer 'Yes' to all these questions, you are ready to install your tape drive. If you answer 'No', you will probably need to purchase and install additional items. For product details, go to `www.hp.com/go/connect`.



SCSI Bus Type	Transfer Speed	Supported
Ultra 3 (160) LVD	Up to 160 MB/s	**Yes.** This is a **recommended** configuration.
Ultra 4 (320) LVD	Up to 320 MB/s	**Yes**. This is a **recommended** configuration.
Ultra 2 LVD	Up to 80 MB/s	Yes, but this is **not** recommended
Ultra single-ended, wide	Up to 40 MB/s	Yes, but this is **not** recommended as it will restrict performance. Do **not** connect to a narrow SCSI bus.
High Voltage Differential	Up to 40 MB/s	No. The drive will not work and you may damage the drive or controller

table 1: supported SCSI bus types

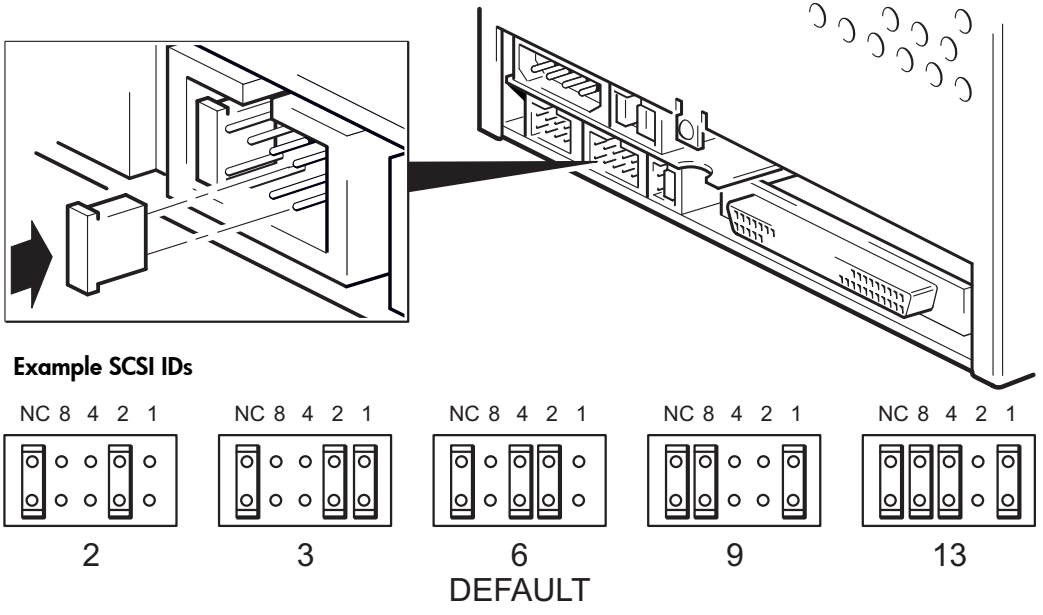


Figure 3a: checking the SCSI ID

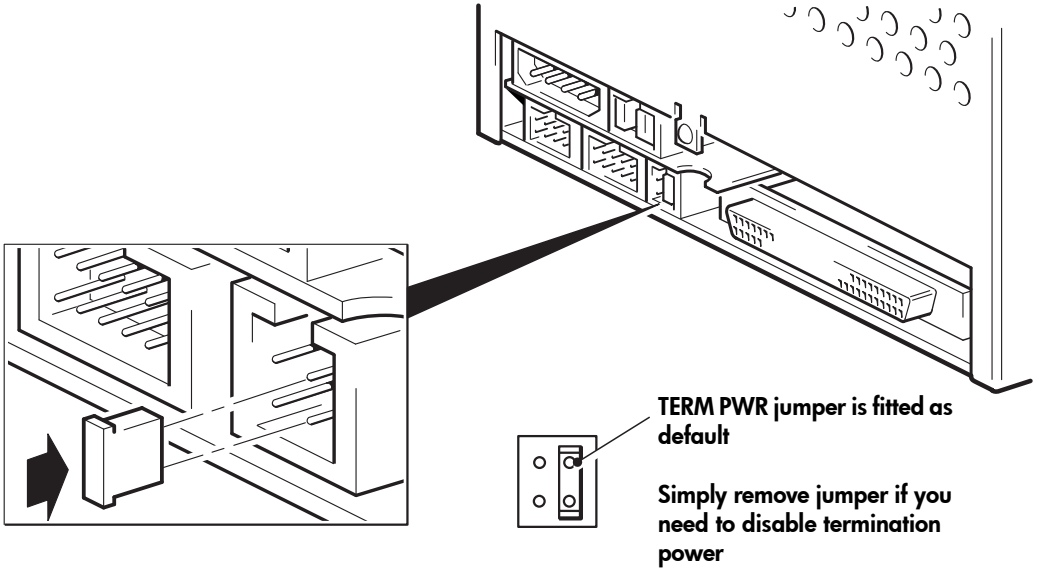


Figure 3b: checking TERM PWR

Step 2: Check the drive's SCSI ID

Your HP StorageWorks SDLT 600 drive is shipped with a default SCSI ID of 6, but it can be assigned any *unused* ID between 0 and 15. Do not use SCSI ID 7, which is reserved for the SCSI controller.SCSI ID 0 is typically assigned to the boot disk and should also not be used unless the tape drive is on a dedicated SCSI bus.

1 Determine whether you need to change the SCSI ID from the default of 6. For example, in multi-initiator parallel SCSI environments (such as ProLiant clusters) it is possible that the initiator devices will use IDs 6 and 7. In this case, you will need to change the tape drive's SCSI ID.

For most operating systems you can install HP Library & Tape Tools from the link on the *HP StorageWorks Tape* CD-ROM and run the "Install Check" to check your server's current SCSI configuration (see page 33). This will provide information about the SCSI bus and the SCSI IDs in use.

For UNIX systems, check the *UNIX Configuration Guide* on the *HP StorageWorks Tape* CD-ROM for instructions on how to determine the SCSI IDs of existing devices.

Caution Static electricity can damage electronic components. Always wear an antistatic wriststrap if possible. If not, to equalize the electromagnetic charges, touch a bare metal part of the server (such as the back plate) before you remove the tape drive from its bag.

2 Change the tape drive's SCSI ID, if necessary.

The SCSI ID is set using jumpers on a set of pins at the rear of the drive. Use tweezers or small pliers to move the jumpers to the pattern corresponding to the ID you want, see Figure 3a. If you do not install any jumpers, the firmware makes the drive default to SCSI ID 6. If you do install jumpers, the left-hand jumper (NC) should always be set.

Spare jumpers are provided with the drive.

Termination power

Your HP StorageWorks SDLT 600 drive is shipped with terminator power enabled, see Figure 3b. This allows the drive, in addition to the SCSI controller, to provide the termination power. It is not normally disabled. Refer to the documentation that came with your SCSI adapter to check that this is the correct configuration. If you need to disable it, simply remove the jumper.

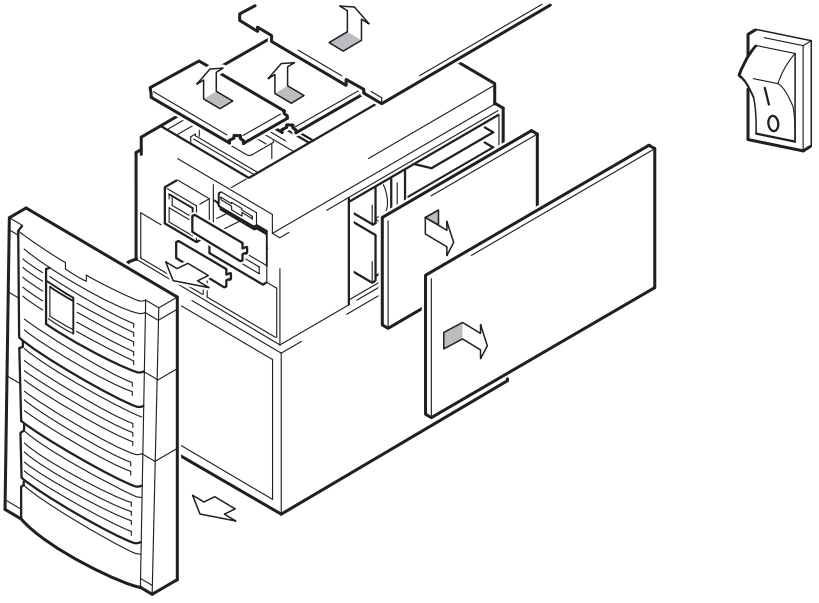


Figure 4a: preparing mounting bay in a typical HP AlphaServer

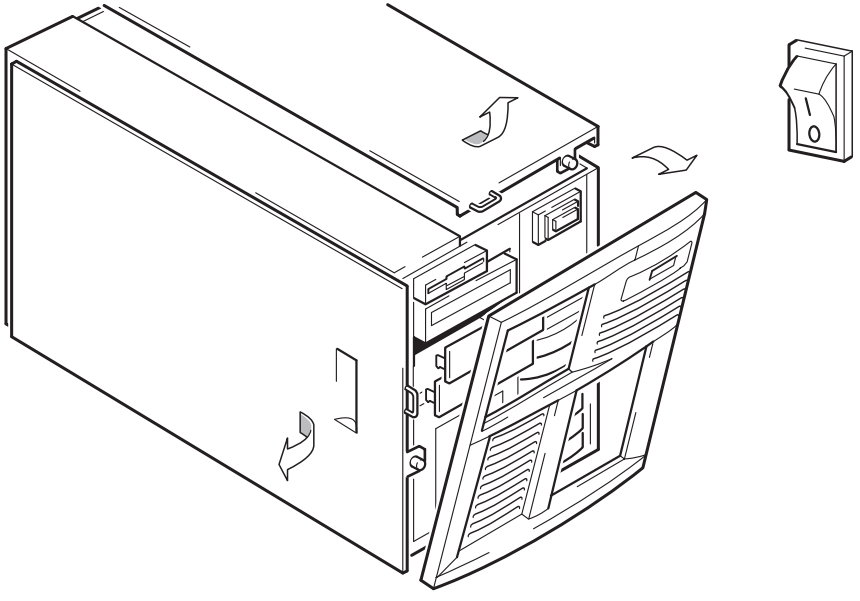


Figure 4b: preparing mounting bay in a typical HP Proliant server

Step 3: Prepare the mounting bay

Warning To avoid personal injury or damage to the server or tape drive, ensure that the server is disconnected from the mains power supply while you install the drive.

Caution Static electricity can damage electronic components. Always wear an antistatic wriststrap if one is available. If not, after you have disconnected power from the server and removed the cover, touch a bare metal part of the chassis. Similarly, touch a bare metal part of the drive before installing it.

1 Assemble the necessary tools and materials:

- Phillips screwdriver
- Flat-bladed screwdriver (if your server uses slotted screws)
- Torx screwdriver (if your server uses torx screws)
- Your server manuals (for reference during installation)

2 Perform a normal system shutdown and turn off the server and any connected peripherals.

3 Remove the cover and front panel from the server, as detailed in your server's documentation.

As you work inside the server, you may have to disconnect the SCSI cable or power cable from other devices to maneuver the new drive into place. If you have to do this, make a note of their position and connections so you can put them back correctly later.

4 Remove the front filler panel from a full-height, 5¼-inch bay of your server, as illustrated. With some servers, such as the HP AlphaServer ES40, you must also remove the half-height device divider.

The internal tape drive requires adequate air flow to dissipate the heat resulting from continuous drive operation. It is important to keep the cooling holes in the rear and the grill in the front of the tape drive clear of any obstructions that may hinder the air flow and to ensure that all fans in your server are in place and operational. Make sure that empty bays have the appropriate blanking plates installed so that airflow is maintained.

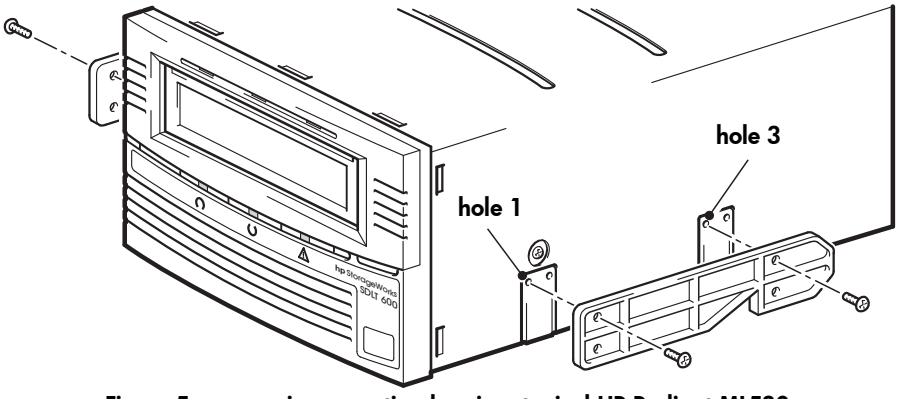


Figure 5a: preparing mounting bay in a typical HP Proliant ML530 server

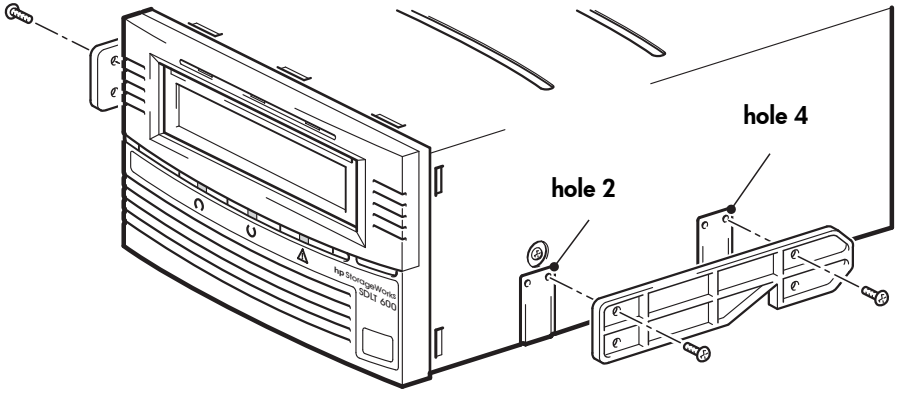


Figure 5b: preparing mounting bay in a typical HP Proliant ML570 server

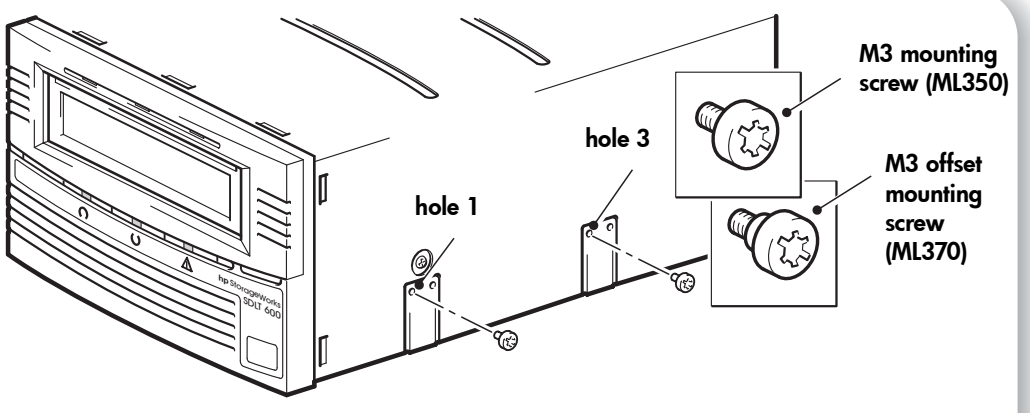


Figure 5c: attach mounting screws in a typical HP Proliant ML350 or 370 server

Step 4: Attach mounting hardware

If your server requires special rails or other hardware to install the tape drive, mount them on the tape drive in this step. *If your server does not require special mounting hardware, proceed to "Step 5: Install the drive" on page 17 now. For example, HP AlphaServers do not require special mounting hardware.*

HP ProLiant servers

Different models of server require different mounting methods. The server may also incorporate a locking mechanism to hold the tape drive in place. See "Step 7: Secure the drive" on page 21.

Please check your HP ProLiant server documentation to ascertain the correct method of mounting, and to check whether mounting hardware is provided with the server.

Mounting rails

Some HP ProLiant servers, such as ML530 and ML570, require mounting rails. These may be metal or plastic rails attached to the server's drive bay filler panel.

1 Use a regular Phillips screwdriver to attach the appropriate rails. Use the M3 screws provided with the tape drive.

For ML530 servers position the screws in the right-hand holes on the tape drive (holes 1 and 3), as shown in Figure 5a. For ML570 servers position the screws in the left-hand holes on the tape drive (holes 2 and 4), as shown in Figure 5b.

Ensure you do use the M3 screws provided - the rails may be attached to the filler panel by screws of a different thread/size type and these should not be used. If in doubt, refer to your HP ProLiant server documentation.

Mounting screws

Other HP ProLiant server models, such as ML350 and ML370, only require the use of special locating screws with no mounting rail.

1 Use a T8 Torx screwdriver to attach the appropriate screws. You may need to purchase the M3 screws separately. Position the screws in the right-hand holes on the tape drive (holes 1 and 3), as shown in Figure 5c.

- HP ProLiant ML350: Use M3 mounting screws. These have a thicker head than the standard M3 screws.
- HP ProLiant ML370: Use M3 offset mounting screws. These have a thick offset piece and a thicker head than the standard M3 screws.

Other servers

1 Attach the appropriate mounting hardware. Refer to the manufacturer's documentation for instructions.

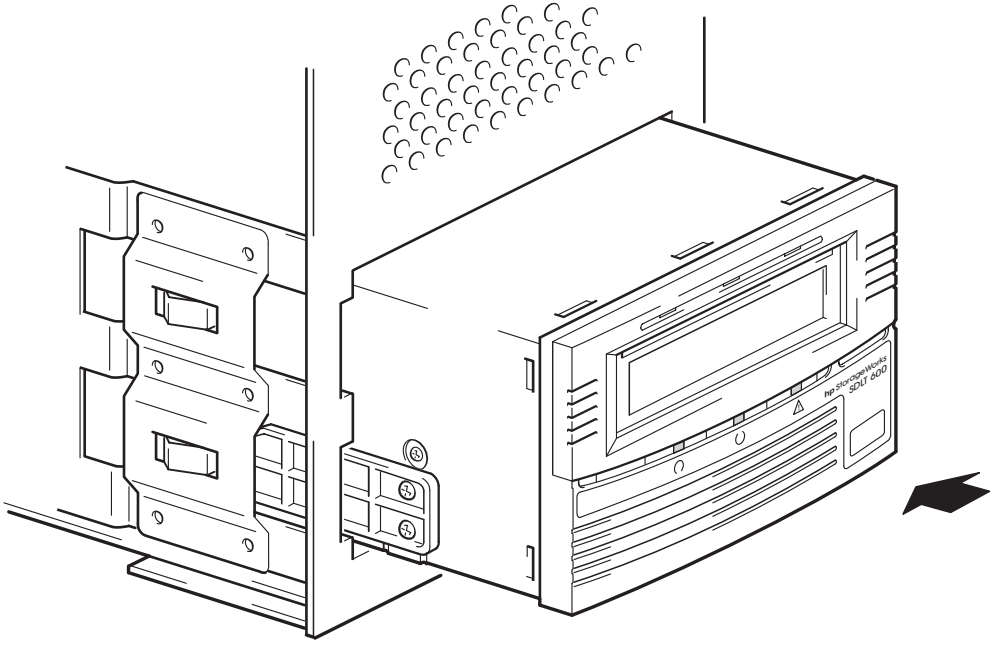


Figure 6: installing the drive

Step 5: Install the drive

1 Slide the tape drive into the open bay, aligning the rails with the slots in the bay, as shown in Figure 6.

If your server does not use mounting hardware, check that the holes in the chassis are aligned with the holes in the side of the tape drive.

Do not secure the drive with screws at this point because you may have to move the drive to get the cables into place.

Orientation

The internal tape drive may be installed top side up, left side down or right side down. Do **not** install it upside down. Check your server documentation to check what orientations it supports.

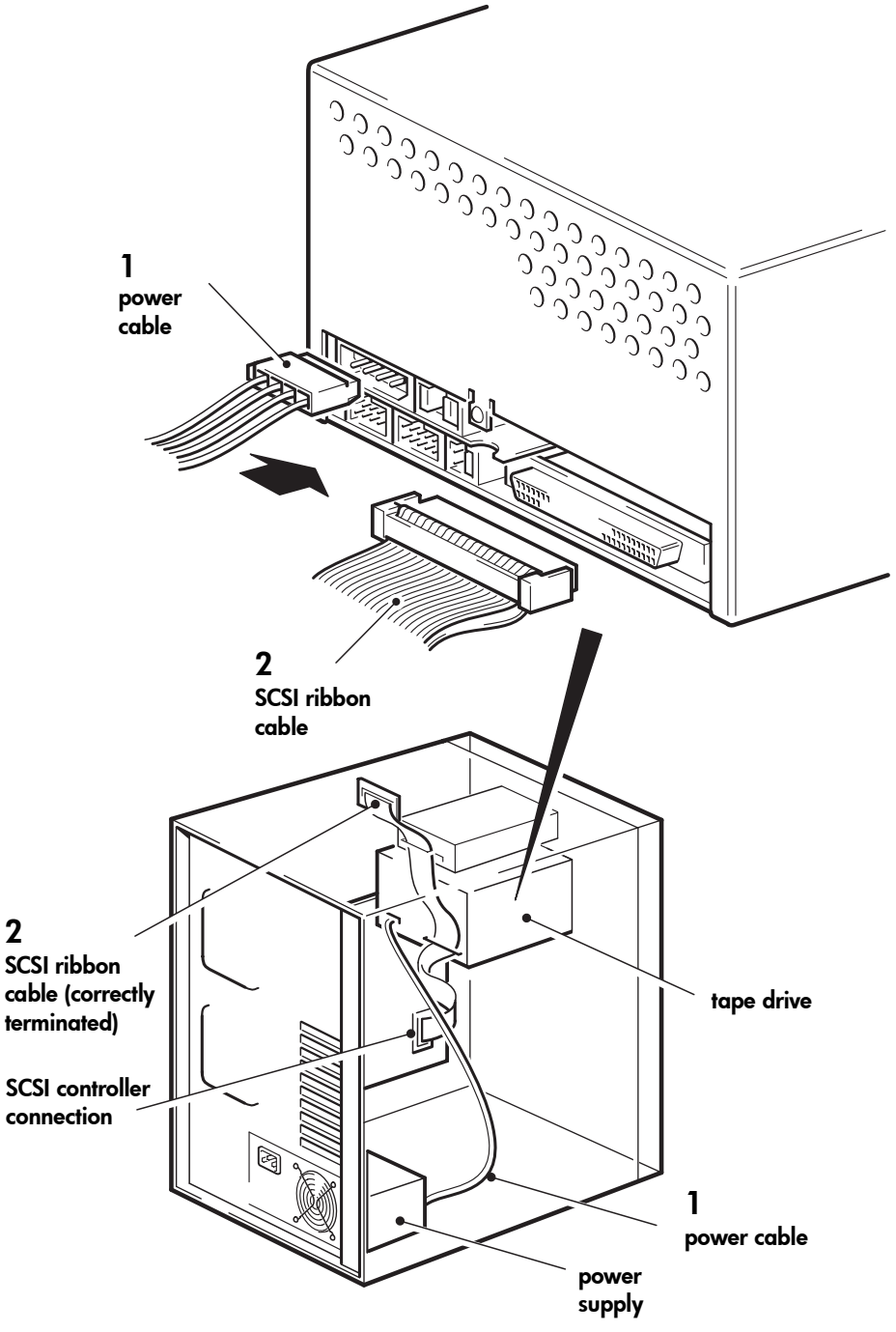


Figure 7: attaching power and SCSI cables

Step 6: Attach power and SCSI cables

To support the high performance of the tape drive it is important to use a suitably-rated SCSI cable. We recommend that you use the ribbon cable supplied with the tape drive. This supports up to Ultra 4 (320) bus speeds.

1 Attach a spare power cable from the server's internal power supply to the power connector, as shown in Figure 7, item 1.

Attach the SCSI ribbon cable supplied with the tape drive to the SCSI host bus adapter or controller.

2 Attach a spare connector on the server or HBA's SCSI ribbon cable to the SCSI connector of the drive, as shown in Figure 7, item 2.

3 If the drive is the last device on the SCSI chain, make sure that the SCSI cable is terminated correctly.

Where should the SCSI terminator be?

Termination must be present at two and ONLY two positions on the SCSI bus—at the beginning of the SCSI bus and at the end of the SCSI bus. Termination is normally enabled by default on the HBA and most internal SCSI cables have a terminator attached. This will usually be a small, rectangular block of plastic attached to the cable end and marked 'SCSI Terminator'.

Therefore, assuming the HBA is the first device on the bus, you should check that the second terminator is placed after the last device, as shown in Figure 7, item 2.

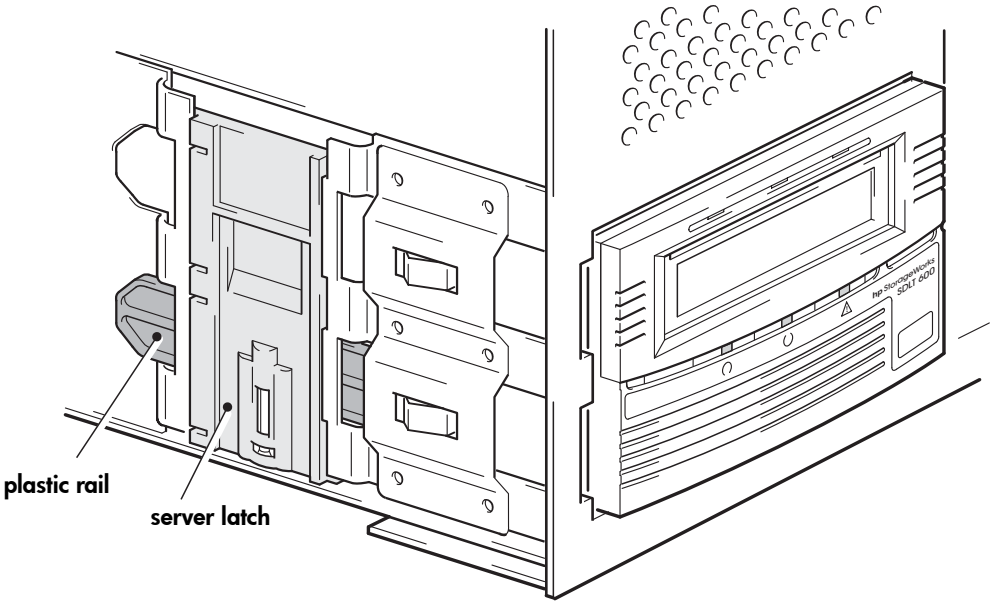


Figure 8a: securing drive to mounting hardware (example shows HP ProLiant ML530)

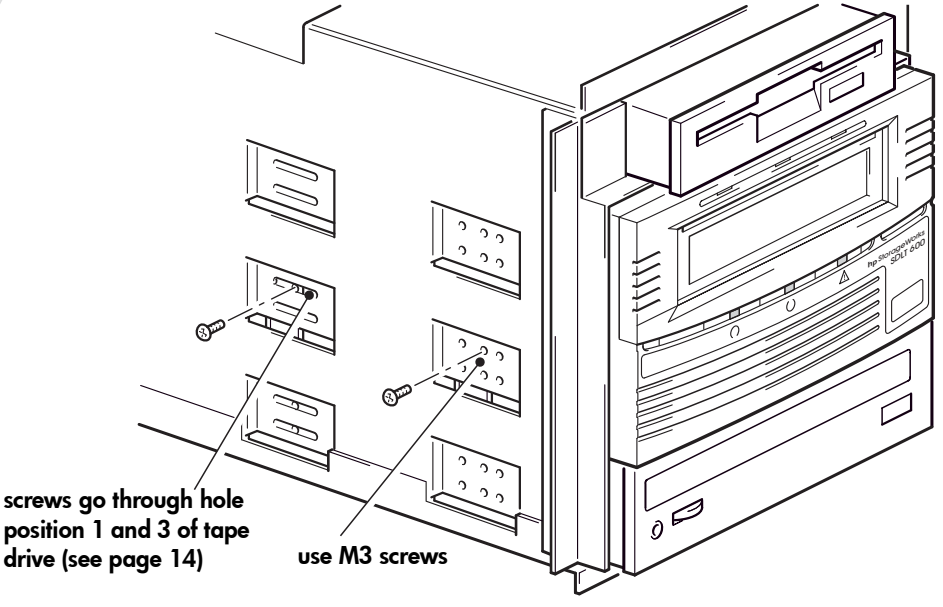


Figure 8b: securing drive, no mounting hardware (example shows HP AlphaServer ES40)

Step 7: Secure the drive

The server latches and side views of your server model may not be exactly the same as shown in the illustrations. Please refer also to you server documentation.

Mounting hardware used (HP ProLiant)

Ensure that you use the correct mounting rails or locating screws, as described in "Step 4: Attach mounting hardware" on page 15. The server also incorporates a locking mechanism to hold the tape drive in place.

1 Push the tape drive firmly into the bay and make sure the server latch is locked in position, as shown in Figure 8a.

2 Replace the cover on the server.

No mounting hardware used (HP AlphaServer)

1 Use the M3 screws provided with the tape drive to secure it in place. Check that the holes in the chassis are aligned with the holes in the sides of the drive and use a regular Phillips screwdriver to secure the M3 screws, as shown in Figure 8b. Position the screws so that they sit in the right-hand holes on the tape drive (holes 1 and 3).

2 Replace the cover on the server.

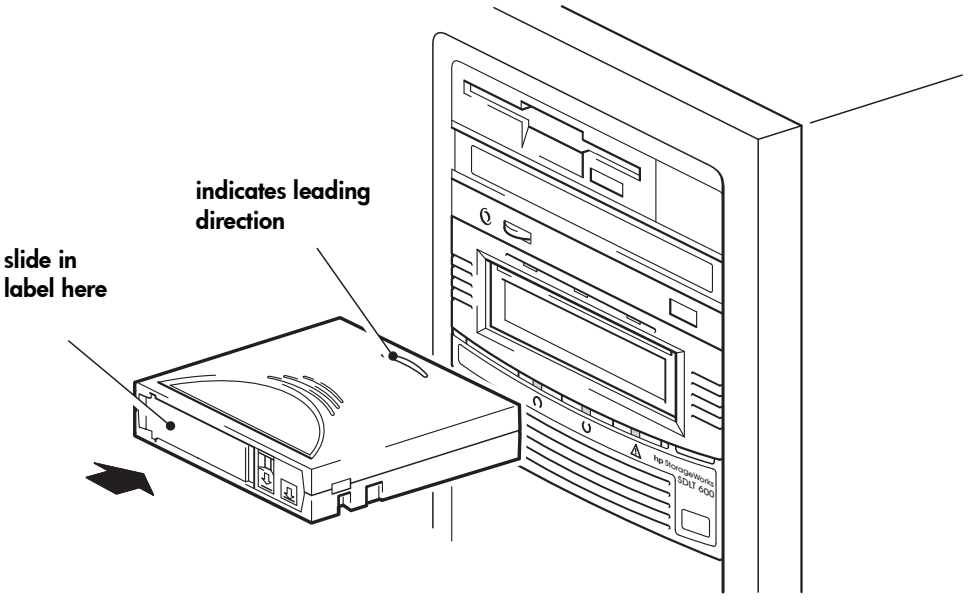


Figure 9a: loading a cartridge

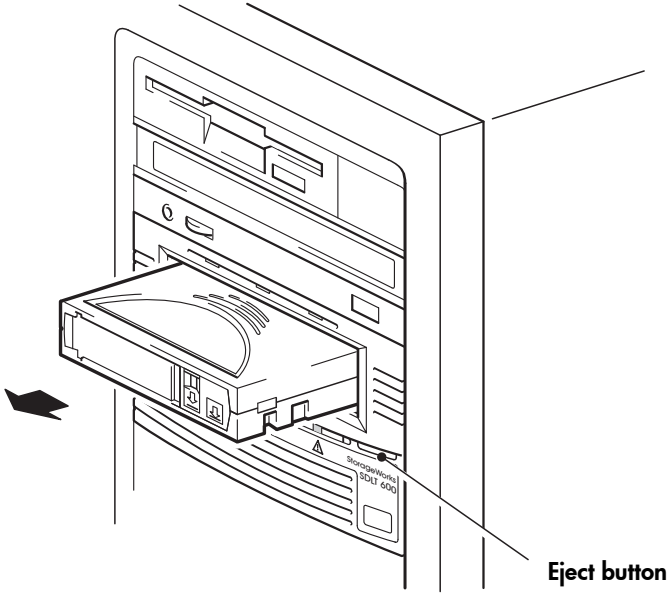


Figure 9b: unloading a cartridge

Step 8: Install drivers and verify installation

Check operation

1. Switch on the server. The tape drive will run its hardware self-test, which takes between 10 to 15 seconds. If self-test passes, the middle LED remains on and the other two LEDs are off. If the test fails, the middle and right LEDs remain on and the left LED flashes. This continues until the drive is reset. See "LEDs during self-test" on page 41 for more information about the LEDs.

2. Install drivers and backup software.

   For all operating systems ensure that you have downloaded drivers and any upgrades necessary for your backup application (see page 5). On Windows systems the Windows Hardware Installation wizard is displayed automatically. We recommend that you close the wizard and install the drivers from the link on the *HP StorageWorks Tape* CD-ROM.

3. Verify that the tape drive installation was successful.

   For most operating systems use HP Library & Tape Tools on the *HP StorageWorks Tape* CD-ROM, as described on page 33. For UNIX systems, the *UNIX Configuration Guide* on the *HP StorageWorks Tape* CD-ROM includes a verification procedure.

   If you encounter a problem during this verification procedure, turn to "Troubleshooting" on page 36 for help in diagnosing and fixing the problem.

4. You are now ready to carry out a backup and restore test to check that the drive can write data to tape. Refer to your backup application documentation for specific instructions. Use the blank cartridge supplied with the tape drive. See "Use the correct media" on page 27 for more information about recommended cartridges.

To load a cartridge

1. Insert the cartridge into the slot in front of the drive with the markings uppermost and facing the drive door. Apply gentle pressure until the drive takes the cartridge and loads it. (See Figure 9a.)

2. The Drive Status LED flashes green while the drive performs its load sequence. When the cartridge is ready for use, the Drive Status LED shows steady green.

To unload a cartridge

Caution Never try to remove a cartridge before it is fully ejected or power off the tape drive while a cartridge is still loaded. Failure to remove a data cartridge may result in cartridge or tape drive damage.

1. Press the Eject button on the front panel. (See Figure 9b.)

2. The drive will complete its current task, rewind the tape to the beginning, and eject the cartridge. The Drive Status LED will flash to indicate that the unload is still in progress and will show steady green, when the cartridge is ready for removal. This may take a maximum of 10 minutes, if the drive has to rewind from the end of the tape.

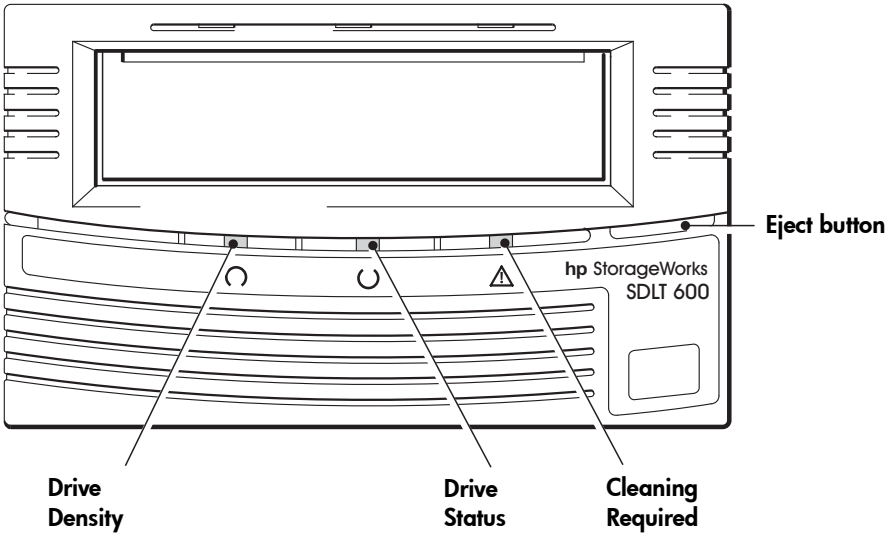


Figure 10: tape drive controls and indicators

Your HP StorageWorks SDLT 600 tape drive

Your HP StorageWorks SDLT 600 tape drive has three LEDs (light emitting diodes) on the front panel, which indicate drive status, and an eject button. The LEDs provide useful troubleshooting information. See also "Understanding the LEDs" on page 41. See page 23 for more information about using the eject button in normal operation.

Front panel LEDs

There are three LEDs as illustrated in the diagram. (See Figure 10.)

Drive Density - left, green/red

- On, green: blank or SDLT 600 formatted Super DLTtape II inserted
- On, red: blank or SDLT 220/320 formatted Super DLTtape I cartridge inserted
- Off: no cartridge inserted
- Flashing-off repeated pattern: the drive is in OBDR mode

Drive Status - middle. green

- On: the drive is ready for use
- Off: the drive power is off or there was a failure during self-test
- Flashing: the drive is busy

Cleaning Required - right, yellow

- On: cleaning is required
- Off: the drive does not require cleaning
- Flashing-off repeated pattern: the drive is in OBDR mode

Eject button

Use the eject button to eject the tape cartridge from the drive. When you press the button, the drive completes any active writing of data to the tape, then ejects the cartridge.

An *overtemp* condition exists when the measured tape path temperature reaches 50° C. When this condition is detected, the tape cartridge is rewound, unloaded, and ejected from the drive. SCSI status will indicate the drive is in the over temperature condition.

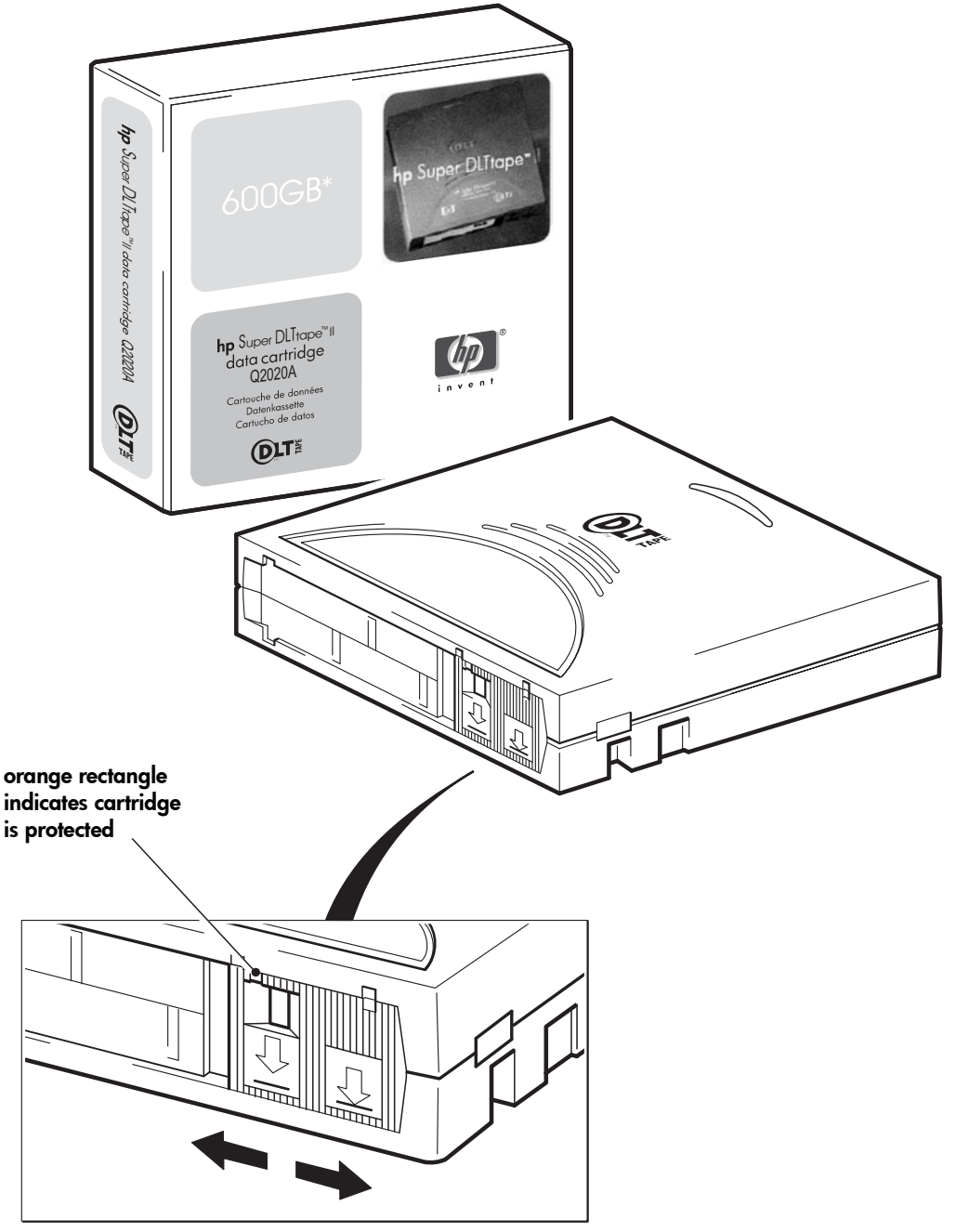


Figure 11: write-protecting cartridges

Use the correct media

For best performance we recommend HP branded media. Order online at: `www.hp.com/go/storagemedia`. If you do not have internet access, refer to the User's Guide on the *HP StorageWorks Tape* CD-ROM for ordering information for tape cartridges and cleaning cartridges.

Data cartridges

Note * All values assume 2:1 compression.

We recommend HP Super DLTtape II 600 GB* tape cartridges for use with your tape drive. These are single-reel cartridges that match your drive's format and are optimized for high capacity, throughput and reliability.

HP StorageWorks SDLT 600 tape drives are also backward-read compatible with some earlier formats, as shown in the following table.

Type of cartridge	Capacity	Compatibility
Super DLTtape II	**600 GB***	**Read/Write**
Super DLTtape I	320 GB*	Read Only
Super DLTtape I	220 GB*	Read Only
DLT formats	Various	None

table 2: SDLT 600 data cartridge compatibility

Note SDLT 600 tape drives will eject a data cartridge written in DLT formats.

Write-protecting cartridges

If you want to protect the data on a cartridge from being altered or overwritten, you can write-protect the cartridge.

If you move the write-protect switch during operation, the write-protect feature does not take effect until after the current write operation completes.

- To write-protect a cartridge, slide the switch to the left; a small orange rectangle is visible.
- To write-enable a cartridge, slide the switch to the right; the orange rectangle is no longer visible.

Figure 11 illustrates the location of the write-protect tab.

Write-protection will not prevent a cartridge being erased by bulk-erasure or degaussing.

Cleaning cartridges

You must use the SDLT CleaningTape with HP StorageWorks SDLT 600 tape drives, as other cleaning cartridges, such as CleaningTape III or DLT VS CleaningTape will not load and run.

Caution Do not use other format cartridges in your tape drive and do not use SDLT CleaningTape cartridges in other format tape drives.

To clean the tape drive:

An SDLT CleaningTape cartridge should only be used when the yellow Cleaning Required LED is constantly lit or when your backup software notifies you that the tape drive needs

cleaning. Do not clean the tape drive unless the tape drive specifically indicates cleaning is necessary.

For ordering information see `www.hp.com/go/storagemedia`.

1 Insert the SDLT CleaningTape cartridge, with the Front Slide Label Slot facing outward.

2 The drive will carry out its cleaning cycle and eject the cartridge on completion, which can take between 1 (the first time that the cartridge is used) and 4 minutes (the 20th time that the cartridge is used). During the cleaning cycle the yellow Cleaning Required LED will be on solidly and the green Drive Status LED will flash.

Each SDLT CleaningTape cartridge can be used up to 20 times. If the cartridge has expired, it will not clean and the yellow Cleaning Required LED will remain on.

Looking after cartridges

Caution You may damage the tape drive if you try to insert and load a damaged cartridge. If you have dropped the cartridge or suspect it may be damaged, please refer to the "Cartridges" topic in the online User's Guide on the *HP StorageWorks Tape* CD-ROM for more detailed information about how to inspect it. This topic also contains comprehensive information about looking after and handling cartridges.

- Do not touch the tape media.
- Do not attempt to clean the tape path or tape guides inside the cartridge.
- Do not leave cartridges in excessively dry or humid conditions. Do not leave cartridges in direct sunlight or in places where magnetic fields are present (for example, under telephones, next to monitors or near transformers).
- Do not drop cartridges or handle them roughly.
- Insert labels into the label area only.
- See the insert included with the tape cartridge for storage conditions.

Register your tape drive

Once you have installed and tested your HP StorageWorks SDLT 600 tape drive, please take a few minutes to register your product. You can register via the web at `www.register.hp.com`.

To ensure your registration is complete, there are a number of questions on the electronic form that are mandatory. Other questions are optional. However, the more you feel able to complete, the better we can meet your needs.

Note HP and its subsidiaries are committed to respecting and protecting your privacy. For further information, please visit our World Wide Web site (`www.hp.com`) and click on Privacy Statement.

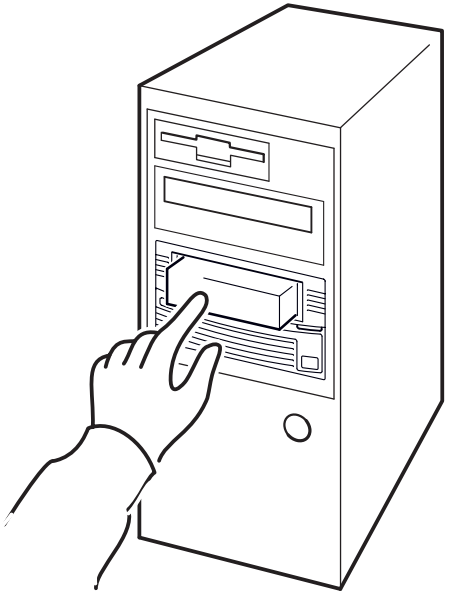


Figure 12a: using HP OBDR, step 1

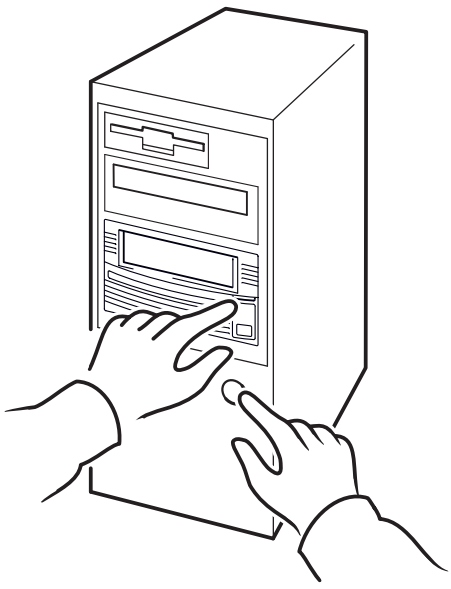


Figure 12b: using HP OBDR, step 2

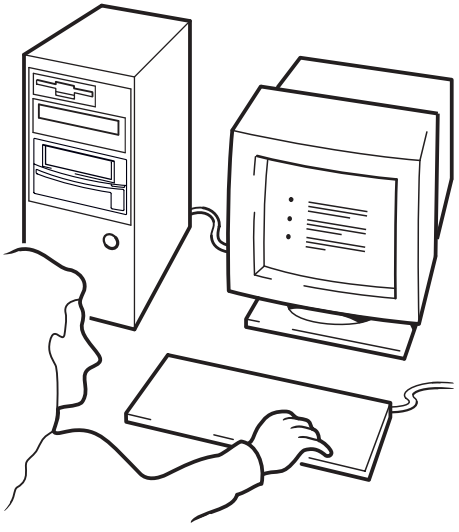


Figure 12c: using HP OBDR, step 3

Using HP OBDR

Compatibility

HP One-Button Disaster Recovery is a standard feature on all HP StorageWorks SDLT 600 tape drives. However, it can only be used with specific configurations and will only recover the server to which the tape drive is directly connected.

To check whether your system (hardware, operating system and backup software) is OBDR-compatible, please refer to our World Wide Web site `www.hp.com/go/connect`.

For more specific information concerning the benefits of OBDR and the latest new features please refer to our World Wide Web site `www.hp.com/go/obdr`.

Note HP OBDR is not applicable to HP-UX and other non-Intel UNIX operating systems, and it is not compatible with Intel-based Solaris systems. HP OBDR is supported on a server with a RAID controller if the tape drive is connected directly to a host bus adapter (HBA).

If your system does not support HP One-Button Disaster Recovery, you can still use your tape drive normally to back up and restore data. However, you must remember to create a separate set of emergency recovery disks for your operating system whenever you change your system configuration.

What does HP OBDR do?

Using just the tape drive and the most recent backup cartridge HP OBDR allows you to recover from the following types of system disaster:

- Hard disk failures, as long as the replacement hard disk is the same size or larger than the original and uses the same interface (for example, replace a SCSI hard disk with another SCSI disk)
- Hardware failures where the server is replaced by an **identical** component
- File corruption because of an operating system error
- File corruption because of an application software error
- Viruses that prevent you from booting your system correctly
- User errors that stop you from booting your system correctly

When you run HP One-Button Disaster Recovery, your tape drive goes through the following sequence:

1. It goes into a special disaster recovery mode that enables it to restore your operating system and reboot. It acts like a bootable CD-ROM. (Your system's ability to boot from CD-ROM is normally enabled by default. If you have changed this setting, you will need to enable it again. Refer to your system BIOS manual for further details.)
2. It returns to normal tape drive mode and restores the data.

Remote disaster recovery (ProLiant servers only)

The HP Remote Insight Lights-Out Edition (RILOE) on ProLiant servers gives the IT Administrator the ability to completely recover a failed server at a remote location without physically traveling to where the server resides. The on-site non-technical person need only insert the bootable cartridge into the tape drive when asked to do so by the administrator.

Refer to the HP OBDR web site at `www.hp.com/go/obdr` for more information about using this feature and compatibility.

Testing for compatibility

We recommend that you perform a full disaster recovery immediately after installation—if possible, onto a blank hard disk. If you do not have a blank hard disk and do not want to overwrite your system, you can safely cancel the disaster recovery process at step 3 in the following procedure.

Refer to our connectivity web site (`www.hp.com/go/connect`) for more information about suitable backup applications.

Running HP OBDR

HP OBDR can only be used with backup applications that support one-button disaster recovery and methods of operating OBDR will vary between different software companies. Check our World Wide Web site (`www.hp.com/go/obdr`) for the latest information about firmware upgrades and troubleshooting before you use HP OBDR.

1. Insert the latest bootable cartridge in the tape drive (see figure 12a). The cartridge must be written by a backup application that writes data to tape in CD-ROM format.

2. Hold down the eject button. Keeping the eject button pressed down, power on your server (see Figure 12b). This puts the device into HP One-Button Disaster Recovery mode when you power on. Release the button as soon as the Drive Density (left) and Cleaning Required (right) LEDs on the front panel flash in the OBDR sequence. This is a repeated pattern of: flash-flash-off. (The Drive Status LED functions as normal; flashing when moving tape and solid when in the ready state.)

   ### Keyboard shortcut for HP ProLiant servers

   There is no need to press the Eject button. Just power on your server and press the [F8] function key during the Power On Self Test (POST). This invokes OBDR to restore your system. For more information and specific instructions please refer to our World Wide Web site at `www.hp.com/go/obdr.`

3. Follow the on-screen instructions to set up the operating system (see Figure 12c). (These will vary depending upon the backup software.) Normally, you can accept the default response to all the prompts, for example just press <Enter>.

4. The LEDs will flash in OBDR mode (as described in step 2) while the tape drive restores your operating system to a state where it can run a normal data restore.

5. Once the operating system has been set up and rebooted, the Drive Status (middle) LED display on the tape drive changes to constant green and you can remove the backup cartridge, if you wish. You are now ready to run a normal data restore. Follow the normal process for your restore application.

If restore fails

If the restore fails for any reason, refer to our World Wide Web site (`www.hp.com/go/obdr`) for detailed troubleshooting information.

Diagnostic tools

HP Library & Tape Tools

HP Library & Tape Tools works on most operating systems, but not all. Compatibility information, updates, and latest version of this software can be found at `www.hp.com/support`.

HP Library & Tape Tools software provides free diagnostic and troubleshooting utilities. It allows you to:

- Quickly identify, diagnose and troubleshoot drive and media problems.
- Verify that the drive is installed correctly and check drive health.
- Upgrade to the latest drive firmware (you will need internet connection to do this)

You can also install HP Library & Tape Tools from the link on the *HP StorageWorks Tape* CD-ROM.

Performance Assessment Tool

For optimum performance your disk sub-system needs to be able to supply data at 36 MB/second (native). You can use our free Performance Assessment Toolkit, PAT, to check tape performance and test whether your disk sub-system can supply data at the optimum transfer rate.

PAT does not work on all operating systems. Compatibility information, updates and the latest version of this software can be found at `www.hp.com/support/pat`.

Optimizing performance

Various factors can affect tape drive performance, particularly in a network environment or if the drive is not on a dedicated SCSI bus. If your tape drive is not performing as well as expected, consider the following points before contacting HP Support at www.hp.com/support.

Is the tape drive on a dedicated SCSI bus?

For optimum performance, we recommend that the tape drive is the only device on the SCSI bus. If it is not, ensure other devices are LVD-compliant. If they are single-ended, the bus will switch to single-ended mode with a lower transfer speed. There will also be restrictions on cable length.

Can your system deliver the required performance?

The HP StorageWorks SDLT 600 tape drive can write data at 36 MB/s (native) or 72 MB/s (compressed, assuming 2:1 compression). However, to get this performance it is essential that your whole system can deliver this performance.

Typical areas where bottlenecks can occur are:

- Disk system (a single hard disk drive will not be able to deliver a transfer rate of 72 MB/s).
- Some file systems are able to transfer data faster than others.
- The type of data being backed up can affect backup performance (for example, file sizes and compressibility).
- Some backup software performs better than others.

To improve performance we strongly recommend a RAIDed disk solution with a large number of physical hard disks.

Some enterprise class backup applications can be made to interleave data from multiple sources, such as clients or disks, to keep the tape drive working at optimum performance.

Performance checklist

The following list summarizes factors that can affect performance. They provide a guideline only of areas that may need further investigation. They do not attempt to explain how to configure individual systems. For a more detailed discussion, including information about tools that allow you to test performance, refer to our white papers on www.hp.com. (Select the product first and look at the Information Library.)

- Is the tape drive reading and writing data at the correct speed?
- Is the source system (hard disk) transferring data at the correct speed?
- Is the backup application writing buffers at the correct speed? You may need to tune the transfer, buffer and block size settings to optimize the speed that the application writes data to the tape drive. HP StorageWorks SDLT 600 tape drives have an internal buffer of 64 MB.

- Is the operating system tuned for performance? You may need to adjust the data transfer packet size.
- Are user applications, such as Exchange or database servers, optimized for backup performance?
- Are there other factors that could be affecting performance, such as interference?

Troubleshooting

The first step in problem-solving is establishing whether the problem lies with the cartridge, the drive, the host server and its connections, or with the way the system is being operated.

Most modern SCSI host bus adapters locate and display attached devices when the system is booting up. On Windows systems, if you swap or connect a product when your system is running, you will need to reboot the system. IA32 systems also usually need to be rebooted. UNIX systems may have pluggable drivers, which allow drives to be attached to a running system and detected without rebooting.

If the device is not detected on boot up, there is probably a problem with the physical hardware: cables, termination, connections, power or the host bus adapter itself. If the device is displayed during boot up but cannot be found in the operating system, this is more likely to be a software problem.

- If you encounter a problem during installation and need further clarification, refer to the "Problems encountered during installation" on page 37.
- If a problem arises during testing after you have installed the drive, refer to the symptom-based section "Testing after installation" on page 39.
- For more information about LED sequences, refer to "Understanding the LEDs" on page 41.
- For information about cartridges, refer to "Problems with cartridges" on page 43.

Users of most operating systems can use HP Library & Tape Tools to help them diagnose problems.

Problems encountered during installation

Unpacking

Description	Further information
Some parts appear to be missing or damaged.	Contact your vendor if any parts need replacing.

The SCSI cable shipped with the drive is not correct

Description	Further information
The SCSI cable shipped with the drive does not plug into the SCSI host adapter of the server.	The cable provided will connect to the majority of systems. if a different cable is required, refer to the `www.hp.com/go/connect` web site.

The screws or mounting hardware are not suitable for the server

Description	Further information
Additional parts may be required for fitting the tape drive into the server.	The HP StorageWorks SDLT 600 internal tape drive will fit into most servers without the need for additional hardware other than that originally shipped with your system. If additional parts are required, or the original parts have been lost, contact your server vendor. See "Step 4: Attach mounting hardware" on page 15.

It is unclear which SCSI ID to use

Description	Further information
It is uncertain which ID numbers are available.	Use HP Library & Tape Tools (see page 33) to provide information on your current SCSI settings. You can also normally check the SCSI configuration from the boot-up screen or from the Windows Control Panel The HP StorageWorks SDLT 600 drive has its SCSI ID set to 6 by default. This should be left unchanged unless this number is already in use. Full instructions on how to change the SCSI ID are given on page 11page 11.

How should the SCSI bus be configured?

Description	Further information
Correct configuration of the SCSI bus with multiple drives can be a complex area and more help may be required.	Refer to the "SCSI Configuration" section in the online User's Guide on the *HP StorageWorks Tape* CD-ROM.

How should the SCSI bus be terminated?

Description	Further information
It is unclear if the bus is already terminated or where an additional terminator should be placed.	Both ends of a SCSI bus must be terminated. Typically, when connecting an internal drive to the ribbon cable already inside your server then both the host bus adapter and the end of the ribbon cable will already be terminated and no further action is required. Refer also to the "SCSI Configuration" section in the online User's Guide on the *HP StorageWorks Tape* CD-ROM.

Is the correct SCSI host bus adapter installed?

Description	Further information
The server already has a SCSI host bus adapter but it is difficult to determine what type it is.	If your server is in its original configuration (no SCSI adapters have been added or removed) then use `www.hp.com/go/connect` to check the compatibility of your system. You can also check the SCSI configuration from the boot-up screen or from the Windows Control Panel, or by using HP Library & Tape Tools (see page 33).
The server may not have a SCSI host bus adapter installed.	Use HP Library & Tape Tools (see page 33) to check whether you have a SCSI host adapter on your system. If not, you will need to purchase one. Refer to the ordering supplies section in the online User's Guide on the *HP StorageWorks Tape* CD-ROM.

Do drivers need to be installed and, if so, which ones

Description	Further information
It is unclear whether there is a need to install drivers onto the system and more help is required.	Detailed information specific to your system can be found on the `www.hp.com/go/connect` web site. For support on Windows operating systems, drivers can be obtained from the *HP StorageWorks Tape* CD-ROM or from `www.hp.com/support`. For support on UNIX systems, see the UNIX Configuration Guide on the *HP StorageWorks Tape* CD-ROM. (Backup software that states support for HP StorageWorks SDLT 600 tape drives also provides the required drivers.)
The required drivers do not appear to be available.	Future drivers will be provided via the support web site when they become available.

Testing after installation

Remember that the system recognizes devices during boot-up. If you swap or connect a product when your system is running, you will need to reboot the system. Rebooting the system will reset devices and will often resolve problems. It is good practice to reboot every time you add a driver or install firmware.

Caution Never power off the drive while a cartridge is still loaded or during a firmware upgrade.

The server does not reboot after installation

Possible reason	Recommended action
You have installed an additional SCSI host bus adapter and its resources are clashing with an existing adapter.	Remove the new host bus adapter and check the server documentation.
You have disconnected the power or SCSI cable from the server's boot disk during the drive installation process.	Check that the cables to all devices are firmly connected.

The server boots but does not recognize the tape drive

Possible reason	Recommended action
The power or SCSI cable is not connected properly.	Check that the cables to the tape drive are firmly connected. Ensure that the SCSI cable is LVDS-compliant and does not have any bent pins. Replace, if necessary. (See the "ordering supplies" topic on the *HP StorageWorks Tape* CD-ROM.)
The SCSI bus is not terminated correctly.	Check that the SCSI bus is actively terminated. (Refer also to the documentation for your SCSI controller and any other SCSI devices you may have.)
The tape drive's SCSI ID address is not unique.	Make sure that each device on the SCSI bus has a unique ID. We recommend that the tape drive is connected to a dedicated host bus adapter. Do not attach the drive to the same SCSI bus as your disk drive, or to a RAID controller.

The application does not recognize the tape drive

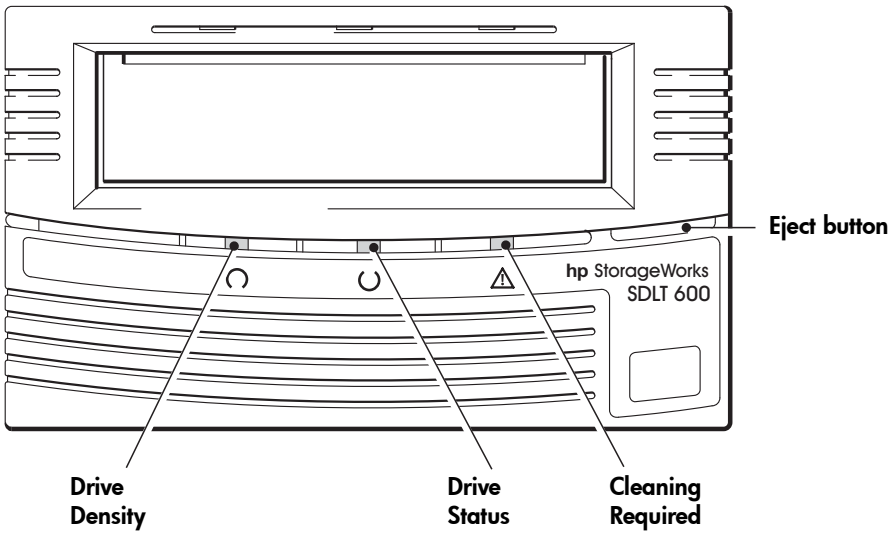
Possible reason	Recommended action
The application does not support the tape drive.	Use HP Library & Tape Tools to check that the drive is installed properly. Refer to our World Wide Web site (`www.hp.com/go/connect`) for details of backup applications that support the HP StorageWorks SDLT 600 tape drive. Load any service packs as necessary.
Some applications require drivers to be loaded.	Check that the correct SCSI and tape drive drivers are installed. Consult the backup application's installation notes for details.

The drive does not work

Possible reason	Recommended action
If the drive does not power up (all LEDs are off), the power cable may not be connected to the drive properly.	Make sure that the power cable is firmly connected. If it is, try another power connector. If the drive still does not power up, call for assistance.
If the self-test fails (see "LEDs during self-test" on page 41), there may be a hardware or firmware failure.	If there is a cartridge in the drive, remove it. Power down the drive and power it up again. Try another power connector. If the self-test still fails, call for assistance.

Understanding the LEDs

LEDs during self-test



Your HP StorageWorks SDLT 600 tape drive has three LEDs (light emitting diodes) on the front panel, which indicate drive status. These LEDs provide useful troubleshooting information.

The tape drive performs a power on self-test whenever power is applied. The test takes between 10 and 15 seconds.

- At power on, all three LEDs are on solid for approximately 1 second and then flash for one iteration.
- During the self-test the Drive Status (middle) LED flashes and the other two LEDs are off.
- If self-test passes, the Drive Status (middle) LED is on solid and the other two LEDs are off.
- If the test fails, the middle and right LEDs remain on and the left LED flashes. This continues until the drive is reset.

Using the LEDs for troubleshooting

If you cannot resolve a problem, contact customer service at `www.hp.com/support`.

Use the following table to interpret the front panel LED sequences and the appropriate action to take, if any.

LED Sequence	Cause	Action required
All LEDs OFF.	Drive may not have power, may be faulty or may have been power cycled or reset during a firmware upgrade.	Make sure the server is switched on. Check the internal power cable connection and replace the cable if necessary. If the power supply is present and all LEDs remain off, power cycle the server. If it still fails, call for service.
Left LED blinks RED; middle LED solid GREEN; right LED solid YELLOW.	The drive has failed to execute power-on self test (POST).	Power cycle or reset the server. If the error condition reappears, call for service.
Middle LED solid GREEN.	The drive is ready for operation.	None. This is normal.
Middle LED blinks GREEN.	The drive is carrying out a normal activity (read, write).	None. If the drive is upgrading firmware, do not reset or power cycle it.
Left LED blinks RED; middle LED solid GREEN; right LED blinks YELLOW.	The drive is in OBDR mode.	See "Running HP OBDR" on page 32 for further details.
Left LED blinks RED; middle LED blinks GREEN.	The drive is downloading firmware.	None. Do not reset or power cycle the drive.
Right LED solid YELLOW	The drive requires cleaning.	Load the cleaning cartridge. See page 27 for supported cartridges and instructions. If the Cleaning Required LED is still illuminated when you load a new or known data cartridge after cleaning, call for service.
Middle LED blinks GREEN; right LED solid YELLOW.	Cleaning is in progress.	None. The cleaning cartridge will eject on completion. The cleaning cycle can take up to 5 minutes to complete.
Left LED blinks or is solid RED; middle LED blinks or is solid GREEN; right LED blinks or is solid YELLOW.	The drive mechanism has detected an error or the drive has a firmware error.	Power cycle or reset the drive. Load the latest firmware. Load a new cartridge. If the problem persists, call for service.

Problems with cartridges

For detailed information about handling and inspecting cartridges for damage, please refer to the online *User's Guide* on the *HP StorageWorks Tape* CD-ROM.

If you experience any problems using HP branded cartridges, check:

- The cartridge case is intact and that it contains no splits, cracks or damage.
- The cartridge has been stored at the correct temperature and humidity. This prevents condensation. See the insert included with the tape cartridge for storage conditions.
- The write-protect switch is fully operational. It should move from side to side with a positive click.
- The World Wide Web site for more detailed troubleshooting information: `www.hp.com/support`.

Cartridge is jammed

If the cartridge is jammed or the backup application is unable to eject it, you can force eject the cartridge. Once the cartridge is successfully ejected, it is good practice to upgrade the firmware. If the failure occurs regularly, contact customer service at `www.hp.com/support`.

1. Press and hold the Eject button on the front of the tape drive for 10 seconds.
2. Wait for the cartridge to be ejected. This process may take up to 15 minutes (the maximum rewind time). It is important that you allow sufficient time for the drive to complete this process. If you interrupt it, you may damage the media or the tape drive.
3. If the cartridge is still jammed, see the "Removing a jammed cartridge" topic in the online *User's Guide* on the *HP StorageWorks Tape* CD-ROM.
4. Wait for the drive to reset and get back to the loaded position. This process may take up to 15 minutes (the maximum rewind time) to complete.
5. Press and hold the Eject button for 10 seconds.

   If the cartridge is still jammed, the tape drive has failed. Contact customer service at `www.hp.com/support`.

The drive will not accept cartridge (or ejects it immediately)

The cartridge may have been damaged, for example dropped, or the drive may have a fault.

Caution You may damage the tape drive if you try to insert and load a damaged cartridge. If you have dropped the cartridge or suspect it may be damaged, please refer to the cartridge care section of the User's Guide on the *HP StorageWorks Tape* CD-ROM for more detailed information about how to inspect it.

1. Check that the drive has power (the power cable is properly connected and the Drive Status LED is on).

2 Check that you are using the correct media. Only use Super DLTtape media, we recommend Super DLTtape II cartridges (see page 27).

3 Make sure that you have loaded the cartridge with the correct orientation (see "To load a cartridge" on page 23).

4 Check for damage to your media (to the cartridge case, leader pin or cartridge teeth) and discard it if it is damaged. See the cartridge care section of the User's Guide on the *HP StorageWorks Tape* CD-ROM for more information about checking the leader pin and cartridge teeth.

5 Use a new or known, good piece of media and see if it loads. If it does, the original cartridge is faulty and should be discarded.

6 If you are confident that the cartridge is not damaged, check if another SDLT 600 drive will accept the cartridge. If it does, the original drive may be faulty. Before calling customer service, please check that the tape drive is responding and that it can be seen on the SCSI bus. Users of most operating systems can use HP Library & Tape Tools to do this, see page 33.

Other sources of information

You will also find troubleshooting information and contact details on the *HP StorageWorks Tape* CD-ROM and the HP web site. In particular:

- The online User's Guide on the *HP StorageWorks Tape* CD-ROM contains an extensive troubleshooting topic.
- The HP support web site contains a link to `www.hp.com/support` that takes you to HP's Customer Care web site for a wide range of up-to-date information about your product.
- The HP web site at `www.hp.com/go/connect` provides details of recommended products and configurations.
- The HP web site at `www.hp.com/go/obdr` provides detailed information about HP One-Button Disaster Recovery.

How to contact HP

You can also use the HP Customer Call Centers for specialist technical help. Contact details can be found at `www.hp.com`. Click on the link to "contact HP".

To make the best use of this service, we ask that you work with our Support Specialists to resolve any issues with your drive. This may include downloading diagnostic software, that will assist in the rapid resolution of your problems. If you do not have web access, a full listing of HP Customer Call Centers, correct at time of printing, is given in the online User's Guide on the *HP StorageWorks Tape* CD-ROM.

Replacing your tape drive

If your tape drive proves to be faulty and cannot be repaired and it is still covered by the original warranty, it will be replaced.

To disconnect your drive

1. Unpack your replacement drive, and retain the packaging.
2. Power off your server and any other devices that are on the same SCSI bus.
3. Remove the cover from the server, see page 13.
4. Observing normal anti-static precautions (see page 13) remove any screws that are holding the tape drive in place.
5. Disconnect the drive from the server's power and SCSI cables and slide it carefully out of the mounting bay.
6. Put the drive into the packaging that contained the replacement drive.
7. Return the faulty drive to your local HP Service Center. Instructions on where to return faulty drives will be shipped with the replacement drive.

Note If you are not replacing the drive immediately, you should insert a blanking plate into the empty bay. Replace the cover on the server and secure with screws, as appropriate.

To reconnect your tape drive

Follow the step-by-step instructions in this Getting Started guide.


http://www.hp.com/go/storagemedia
HP Super DLTtape™ II
600GB Q2020A
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http://www.hp.com/support/tape

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